Homework 1

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ex1)

We assume that in this Neural Network that there is a hidden layer and an output layer. The Hidden layer will contain 2 nodes used to get a preactivation values.

ex4)

$$
\begin{array}{c|cc|c}
 & X_1 & X_2 & Y \\
\hline
a_0 & -1 & -1 & -1 \\
a_1 & 1 & 1 & -1 \\
a_2 & 1 & -1 & 1 \\
a_3 & -1 & 1 & 1 \\
\end{array}
\tag{1}
$$

The Starting $\vec{w}$ is $\{0, 0\}$ with an $\alpha = 1$

Step 1)

$$
\begin{aligned}
\vec{w_1} &= \vec{w_0} + \alpha * (-1) * a_0 \\
&= \{1, 1\}
\end{aligned}
\tag{1}
$$

Step 2)

$$
\begin{aligned}
\vec{w_2} &= \vec{w_1} + \alpha * (-1) * a_1 \\
&= \{2, 2\}
\end{aligned}
\tag{2}
$$

Step 3)

$$
\begin{aligned}
\vec{w_3} &= \vec{w_2} + \alpha * (1) * a_2 \\
&= \{3, 1\}
\end{aligned}
\tag{3}
$$

Step 4)

$$
\begin{aligned}
\vec{w_4} &= \vec{w_3} + \alpha * (1) * a_3 \\
&= \{2, 2\}
\end{aligned}
\tag{4}
$$

After a few Cycles, we see that it will not converge at all. This is because these points can not be linearly seperated